

**Appendix A**

**Final Peer Review Comments on  
the Calcasieu River and Pass, Louisiana DMMP and SEIS**

**Comment 1:**

**The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.**

**Basis for Comment:**

Sustainability issues related to the project beyond 20 years should be considered in the DMMP. While the report consistently addresses the 20-year life of the project, ER 1105-2-100 states that DMMP plans are to consider at least the next 20 years. This distinction is important with regard to future sustainability, as the ER implies that 20 years is the minimum planning period and that some consideration should be given to the longer term beyond 20 years.

It is important to consider sustainability because it may influence selection of one alternative over another. Planning Objective 4, to provide flexibility for future disposal of dredged material, implies that sustainability is an important objective, yet the report does not address which of the plan alternatives is most sustainable beyond the 20 year minimum planning period. The long-term sustainability should be addressed in the discussion of alternatives and should be a criterion in the evaluation of alternatives. If two alternatives are otherwise comparable, the one capable of adapting over the long-term and remaining sustainable for more than 20 years should receive higher ratings.

Several specific issues should be addressed with regard to long-term sustainability:

(1) Sustainability of Confined Disposal Facilities (CDFs) over the long term. The end point of Alternative B at year 20 is no excess disposal capacity with CDFs filled to capacity. Questions that should be evaluated over a longer time horizon include the ability to create new CDFs, the ability of CDFs to be expanded further in various segments of the channel, impacts of further expansion on Lake Calcasieu and oyster habitat, and the eventual need to abandon CDFs in favor of beneficial use (BU) sites after year 20.

(2) Expansion of BU sites over the long term. Several sustainability issues exist for Alternative C, where concerns over long-term real-estate acquisition may be more important, and where costs of spreading of large quantities of dredge material through long pipelines and spreading in thin layers over thousands of acres are more uncertain. On the positive side, this alternative may have greater environmental sustainability in the long term.

(3) The impact of the deep navigation channel on its surroundings. Deep-dredged channels can act as sediment traps to enhance or accelerate erosion of land and marsh areas surrounding them, and these channels can accelerate the removal of sediment out of the estuary. The physical impacts of the channel on surroundings wetland and shallow lake environments, with removal of 96 mcy in 20 yr and almost 250 mcy in 50 yrs, should be addressed. The sustainability of long-term disposal of material from the entrance channel into the Ocean Dredged Material Disposal Site (ODMDS) should be addressed.

(4) The impact of future sea level rise (SLR) on the various alternatives. The very high relative SLR in coastal Louisiana, and the EPA projections of accelerated SLR in the future, will have impacts on the various alternatives. A key factor in the successful functioning of the marshes that will be created will be their elevation relative to sea level. Even over a 20-year period the relative rise in sea level in the project area may be significant, in terms of water level and potential for erosion of created marshes. How sea level factors into future land loss needs to be considered. It would seem reasonable to at least discuss the erosion potential and sea level rise (eustatic and subsidence) for the next 20 years and how this will affect the functions provided by the marsh creation.

**Significance – High:**

The navigation channel will likely be maintained well beyond 20 years and the DMMP must address sustainability issues beyond 20 years. Long-term sustainability may influence the evaluation and selection of alternatives.

**Comment Cross-referencing:**

- (2) *Options to reduce the dredging requirement (average rate of dredging) should be investigated.*
- (3) *A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (6) *The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.*
- (8) *The method for combining evaluation criteria to determine evaluation scores is not sufficiently supported.*

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- The time period of the analysis should be divided into an initial 20-year segment examined in significant detail (as done in the DMMP) and an additional 20 or 30 year segment examined in more general terms for longer-term sustainability issues.
- Issues noted in Basis for Comment above should be addressed. The most important issue is that long-term sustainability should be addressed for the four main project alternatives, and sustainability should be included in the analysis and selection of alternatives.
- Sustainability can be addressed through additional text. Apart from simple numerical projections, e.g. 96 mcy in 20 yrs projected to 240 mcy in 50 yrs, no lengthy numerical analysis is suggested or required, and there is no need to run cost, volume, or similar lengthy tables out beyond 20 years.

**Comment 2:**

**Options to reduce the dredging requirement (average rate of dredging) should be investigated.**

**Basis for Comment:**

Dredging practice may be contributing significantly to the dredging requirement, thereby contributing to the disposal capacity deficit. For example, the report states that erosion of the CDFs, located adjacent to the channel, is contributing to channel shoaling.

Reducing the dredging requirement may be a more cost-effective way of increasing disposal capacity, and may increase project sustainability. If, for example, the CDFs are a significant contributor to the channel shoaling, placing more sediment in the CDFs may be counter-productive.

The report states the purpose of the DMMP is to "...develop a plan for the placement of material dredged from the maintenance of the Calcasieu Ship Channel and anticipated improvements, to develop management strategies to maximize the capacity of the recommended placement plan, and to attempt to reduce dredging frequencies and quantities." While the report focuses adequately on the first two goals, it does not address the third goal. Reduction in dredging volume and frequency (and therefore cost) should be a primary goal of a DMMP, and this report does not present any strategies or options for reducing the amount of material dredged or the frequency of dredging. This issue needs to be addressed in the final report and plan.

There is an assumption in the report that dredging must maintain authorized project dimensions of 40-ft depth and 400-ft width. However, a portion of the channel has not been maintained to the authorized width, and no data are presented that shows this reduction in width is having a negative effect on navigation safety or economics. The lack of demonstrated safety or economic consequences of reducing channel width leads to the question: Can this reduction in width be part of the permanent solution to minimize dredging volumes for all or portions of the channel? This should be addressed.

**Significance – High:**

Options to reduce dredging requirement may greatly improve the project performance. If dredging practice is not changed, there is a risk that the rate of future dredging may be higher than estimated for the selected alternative.

**Comment Cross-referencing:**

- (1) *The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.*
- (3) *A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (4) *Several appendices were written primarily to support Alternative B and thus, do not evaluate Alternative C.*

- (5) *Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability.*
- (6) *The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.*
- (9) *Several elements within the economic analysis are not sufficiently described.*
- (14) *There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.*

#### **Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- In Appendix A: Shoaling Analysis include more detailed analysis of shoaling patterns and rates using surveys of channel depths, including: grade changes beyond the channel, to the limits of significant changes
- Also in Appendix A, quantify erosion of CDFs and investigate ship wake and quantify linkage to CDF and other erosion and shoaling.
- Investigate ship traffic operational controls that reduce wave-induced erosion and sedimentation, such as reduced speeds, moving with (not against) tide and navigation route (e.g., distance from bank, direction)
- Information pertaining to dredging design needs to be reconsidered. For example:
  - Channel side slope stability - Investigate slope stability and benefit of cutting flatter slopes, in order to reduce slope sloughing and sedimentation.
  - Discuss whether box cuts and over-dredging are increasing the maintenance dredging requirement
  - Discuss different channel dimensions – e.g. narrower channel similar to existing.
  - Define whether the concept of placing CDFs adjacent to the channel to block wind waves is valid based on available information
  - Discuss whether off-site disposal reduces the rate of recycling of dredged material
  - Develop CDF armoring options, including an evaluation of innovative biotechnical methods.
  - Update the Geotechnical Analysis (Appendix B) to include slope stability analysis of dredged channel slopes (including box cuts), slope stability analysis of existing CDF dikes, including eroded state, and analysis of rock structures proposed for CDFs

**Comment 3:**

**A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.**

**Basis for Comment:**

The very high shoaling rates and project costs logically lead practitioners to the question “Where is all this sediment coming from?” A Sediment Budget Analysis is mentioned several times, but results are not provided to a level useful to the DMMP.

Three estimates of future dredging are identified (in million cubic yards per 20 years): 68, 97 and 126. While the selected projection (97 mcy/20 years) may be reasonable, the range of estimates is disconcerting. Also, the risk of higher dredging rates was not addressed.

Appendix A does not analyze the sources of sediment shoaling, and the appendix does not give the reader the impression that sources of sediment are well understood. It does not address the fundamental question: “Where does 96 mcy of material come from over 20 years?”

This is a major weakness of the study. Some form of sediment budget is required to update the DMMP. The hydrodynamic and sediment transport study (Appendix C) addresses transport of sediment but not sources of sediment. The report does not provide clear indications of the relative importance of the following on sedimentation: (1) river discharge of the Calcasieu River, (2) erosion of surrounding marshes, (3) erosion of the channel banks, dikes, and existing CDFs, or (4) tidal inflow from the Gulf of Mexico. As noted previously, reduction in the dredge volumes should be a major goal of the project - and sedimentation volumes can only be reduced if their source is understood.

No analysis of shoaling in the Entrance Channel is included. As noted, the sediment volume dredged from the Entrance channel (8 mcy/yr) exceeds that dredged from interior channel (projected at 4.8 mcy/yr) so some treatment of the entrance channel shoaling should be included.

In several places, the report suggests that erosion of channel-side dikes has contributed to shoaling volumes. For example, p.1-13 states that: “The authorized plan ...has washed back into the lake and channel because of failure of the lake-side retaining dikes. These failures have resulted in excessive shoaling and maintenance requirements, and environmental damage to adjacent lake areas.” The report does not address this issue in a coherent and systematic way. This should get more attention, especially given the large costs projected for revetment construction to prevent erosion of the CDFs back into the channel.

**Significance – High:**

The credibility of the study is undermined by an inadequate explanation of the causes of the high shoaling and maintenance dredging requirements, and in particular whether the future dredging estimates are likely to be accurate, and whether the alternative selection is justified.

**Comment Cross-referencing:**

- (1) The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.*
- (3) A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (4) Several appendices were written primarily to support Alternative B and thus, do not evaluate Alternative C.*
- (5) Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability.*
- (6) The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.*
- (9) Several elements within the economic analysis are not sufficiently described.*
- (14) There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.*

**Recommendations for Resolution:**

The report should be revised to include a sediment budget analysis for sediment depositing in the channel. The goal is to understand sediment processes to facilitate key objectives: (1) reduce maintenance dredging, 2) support an estimate of future dredging requirement, (3) mitigate project effects that are negative, (4) maximize beneficial reuse of sediment as a resource. The analysis should address influx, outflux and storage changes within the project vicinity in terms of volumes over time, and including transport mechanisms, pathways, and rates. In addition, an analysis of historic and future conditions, using geomorphic interpretations that build upon shoaling and hydrodynamic analyses should be included. Specific items that will probably be needed are:

- Erosion from CDFs
- Volume from marshes, including pathways
- Volume from lakes, including tides and waves
- Volume from gulf (sands and fine sediment inflow), link analysis to change in inlet to Gulf due to navigation entrance; include beaches in sand budget
- Volume from river and flocculation processes
- Transport and deposition rates, based on surveys
- Link the sediment budget to geomorphic and morphometric analyses that address the sediment budget change over time, in response to major disturbances including the Calcasieu Channel and Gulf Intercoastal Waterway.
- Link the sediment budget analysis with hydrodynamic tools such as the hydrodynamic modeling.
- Estimate storage changes based on elevation changes (surveys and maps).
- Address relative sea level rise and biomass production which affect sediment budget.
- More detailed shoaling analysis (Appendix A) to support sediment budget.
- Expanded Geotechnical assessment (Appendix B) to address slope failures and subsidence.
- Improvement of hydrodynamic analysis (Appendix C) to support sediment budget.
- Define the source(s) of fines and sands based on data and analysis.

**Comment 4:**

**Several appendices were written primarily to support Alternative B and thus do not evaluate Alternative C. If Alternative C is ultimately selected as the preferred plan, several appendices may not apply and additional work may be required.**

**Basis for Comment:**

At the outset of the review, the Peer Review Group was informed that the preferred alternative and recommended plan may change from Alternative B to Alternative C in the final report. To fit the tight time constraints for peer review, the report was reviewed “as written” with Alternative B as the preferred alternative. It is noted, however, that many of the appendices appear to have been written with Alternative B having specifically been identified as the preferred plan. As a result, these appendices do not treat Alternative C (or other Alternatives) in the same level of detail or in a balanced way. If Alternative C were to be ultimately selected, some of technical appendices would have to be re-written, and some technical analyses redone, to support Alternative C.

Specific issues include the following:

- (1) Appendix A (Shoaling) and Main Report contain detailed aerial photographs and maps of CDFs under Alternative B but do not show similar levels of detail for Beneficial Use sites under Alternative C.
- (2) Appendix B (Geotechnical) evaluates sediment characteristics and dike stability issues associated with confined disposal sites under Alternative B. No similar analysis was conducted for dike stability or geotechnical issues related to Beneficial Use sites listed under Alternative C. One unique aspect of Beneficial Use sites is that some dikes are to be designed to degrade over time, but the geotechnical aspects of this were not evaluated.
- (3) Appendix C (Hydrodynamics and Sediment Transport) evaluates conditions for Alternative B and does not consider conditions related to Alternative C. Alternative C mainly involves wetland creation or marsh enhancement in areas well west of the shipping channel. Some of these areas are presently open shallow water. Filling large open water areas and digging sidecast borrow ditches may alter the hydrodynamic regime in these areas, and may influence transport of suspended sediment in these areas. These impacts have not been investigated in Appendix C or anywhere else in the DMMP.
- (4) Appendix K (CZMA (or Coastal Zone Management Act) Consistency Determination) is written mainly for Alternative B, as cited under description of Proposed Action, and may not fully apply to Alternative C.
- (5) Appendix T (Real Estate) appears to focus on Alternative B and has very little text and no cost estimates for Alternative C. Other sections of the report describe real estate issues as being more uncertain for Alternative C than B, but these issues are not fully evaluated in this appendix. As a result, the appendix gives an incomplete assessment of real estate issues, when these are crucial to the viability of alternative C.

<b>Significance – High:</b>
Alternative C, which is a close second in the project evaluation and which appears to be the preferred plan for local interests, was not evaluated in detail in many of the technical Appendices. If Alternative C is ultimately selected, many of these appendices will have to be modified to support the selected plan.
<b>Comment Cross-referencing:</b>
<p>(5) <i>Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability. The feasibility of many dike sections is not established.</i></p> <p>(7) <i>The report does not provide sufficient detail about the proposals and the selection process for Beneficial Use (BU) sites.</i></p> <p>(9) <i>Several elements within the economic analysis are not sufficiently described.</i></p> <p>(11) <i>The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.</i></p> <p>(12) <i>A more thorough summary of prior studies, and of public and agency input, is needed.</i></p>
<b>Recommendations for Resolution:</b>
<p>To resolve these concerns, the report would need to be expanded to include:</p> <ul style="list-style-type: none"> <li>▪ Issues noted in Basis for Comment above must be addressed if Alternative C is eventually selected as the recommended plan over Alternative B.</li> <li>▪ A more balanced treatment of alternatives would be useful in the appendices but is probably not required in this DMMP unless the recommended plan changes to Alternative C</li> <li>▪ Future revisions of the DMMP (in 5 years or so) should adopt a more balanced view of major alternatives to ensure that each is addressed in technical appendices.</li> </ul>

**Comment 5:**

**Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability. The feasibility of many dike sections is not established.**

**Basis for Comment:**

The report contains just two “typical” or generic cross sections of the proposed dike sections in Figures 5-1 and 5-2, but these do not appear to be representative of many of the dikes required to implement the recommended plan, and they are insufficient to establish the feasibility of all dike sections. While it is recognized that this is a planning level document, and not a detailed design, the typical plans do not adequately portray the many different types of dikes described in the document.

Specific issues may be identified:

(1) Figure 5-1 is unclear and must be redrawn as it does not convey realistic site conditions. The drawing does not show a vertical datum or typical water levels. Typical existing grade elevations are not indicated. As a result, it is unclear if the existing grade, or dike toe, is above or below mean sea level. The vertical cut (or depth) of the borrow pit is not indicated. This may affect slope stability and was not evaluated in Appendix B.

(2) Figure 5-1 does not represent dikes required to expand CDFs D/E and 17/19 toward the channel on the west and into Lake Calcasieu on the east.

(a) Figure 5-1 does not represent channel-side or foreshore dikes that are to be advanced toward the channel into finite water depth. The report states that these dikes would be 23 ft high (-3 ft to +20 ft), much higher than shown in Fig 5-1. A new drawing should show these dike elevations, the existing grade extending to the 40-ft deep navigation channel, and the stone shore protection planned for these dikes.

(b) Figure 5-1 does not represent lake-side dikes that are to be advanced into finite water depth of Lake Calcasieu. No indication is given of toe depths or of stone shore protection for these dikes. A new drawing should be more realistic, with realistic lake bed elevations, and should show marsh cross sections to be built at the toe of this dike. Rock dikes planned to extend the marsh into the lake should also be indicated.

(3) Figure 5-2 for Beneficial Use sites must be re-drawn to provide more detail. There is no indication of datum, existing grade elevations, water levels, or of proposed fill elevations. Dimensions of side-cast borrow ditches adjacent to the dike should be shown.

(4) The slope stability analysis in Appendix B uses dike cross sections that do not reflect either the typical cross section in Figure 5-1 or the various other dike cross sections noted in (2) and (3) above. The stability of the analyzed dike cross section has a rather low factor of safety. Higher dikes, with deeper water at the toe are proposed that may have lower factors of safety. For example, the dike analyzed in App B is raised 5 ft from +7 to +12, while the main report notes dikes being raised by 8 to 10 ft and by up to 23 ft for foreshore dikes. These have not been analyzed and their stability has not been established.

(5) The influence on dike stability of the large drawdown due to passing ships (over 5 ft lowering of water level shown in App C) should be addressed. It would appear that new 23 ft high channel-side or foreshore dikes, may have minimum stability during these draw down events. This should be analyzed to prove the viability and feasibility of these dikes required to expand the capacity of CDFs.

(6) The need for, or lack of need for, stone armoring of channel side or lake-side dikes has not been fully established. A specific linkage between vessel wakes and erosion or stability of these dikes was not established. No analysis of wind-waves on the dike slopes was considered. As a result, miles of stone armoring are proposed that have not been fully justified. Other miles of unarmored dikes could be at risk, but the erosion risk has not been evaluated.

(7) The report is inconsistent in use of vertical datums. Some figures use NAVD88, some use GLW, and other show no datum at all (Figure 5-1, Plate 3 App B). Some discussion of datums is needed because raising dike elevations and establishing marshes to certain elevations is critical to the project.

(8) Plans for wetlands in BU sites are not very detailed, and it is hard to understand what is proposed in sufficient detail to assess likely performance. Technical issues such as hydrodynamic flows in side-cast borrow ditches, degradation of dikes has not been analyzed, and effects relative sea level rise have not been evaluated. These will become a critical comment if Alternative C is selected as the preferred plan.

**Significance – High:**

Dike construction is the major technical or engineering challenge of the project yet planning level details or analysis of the various dike designs are not sufficient to establish the feasibility of the various dike cross sections.

**Comment Cross-referencing:**

- (1) The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.*
- (2) Options to reduce the dredging requirement (average rate of dredging) should be investigated.*
- (3) A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (7) The report does not provide sufficient detail about the proposals and the selection process for Beneficial Use (BU) sites.*
- (11) The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.*
- (14) There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.*

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- Issues noted in Basis for Comment above should be addressed.
- It is critical to develop better graphics of dike cross-sections. This change must be incorporated into the final DMMP
- It is critical to establish the stability and feasibility of the highest and least stable dike cross sections proposed. This is critical to viability of the recommended plan.

**Comment 6:**

**The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.**

**Basis for Comment:**

The SEIS is deficient in assessing the project impacts to the Gulf of Mexico shoreline, and the tributary wetlands, and whether the DMMP could be modified to mitigate these impacts to some degree.

*Tributary Wetlands:* The SEIS states that the wetlands in the vicinity are being lost due to subsidence and other factors, including reduced sediment supply. The SEIS also states that there are sediment pathways from wetlands to the channel, and that the channel may be contributing to a sediment deficit leading to degradation of wetlands. What is the cumulative impact of increased dredging on the tributary wetlands? Does Alternative C mitigate this adverse effect more than Alternative B?

The Selected Alternative includes beneficial reuse of dredged sediments to enhance wetlands in the Sabine and other wetland areas to the west of the channel. However, without addressing the impacts of the Calcasieu Channel project, it is difficult to assess whether the proposed wetland enhancement mitigates for project impacts.

*Gulf of Mexico Shoreline:* The update to the DMMP does not include a serious assessment of the lower reaches of the project (the entrance and lower five miles of the channel). For example, the report indicates that marine sands deposit in the entrance and lower 5 to 10 miles of the channel, and disposal is (all?) offshore or inland. Also, the report states that the pre-project tidal inlet had a shallow depth. Therefore, it is logical to conclude that the project results in removal of marine sands from the Gulf shores at a rate higher than the natural historic rate. Large deficits to beach sand budgets typically result in shore erosion, resulting in a desire for nearshore disposal to mitigate erosion. That this DMMP/SEIS update is largely silent on this topic is puzzling and a shortcoming.

The report does not adequately address the dredge material management issues in the entrance channel (mile 0 to -32), or the continued use of the ODMDS. The entire Calcasieu River and Pass extends from mile -32 (offshore) to mile 36 (Lake Charles) for a distance of 68 miles, yet the DMMP really only addresses miles 5 to 36 in detail. Dredge management issues related to miles -32 to +5 need more thorough coverage. The report indicates that annual dredging requirements for the entrance channel, about 8 mcy/yr, exceed those of the lake and river channels, about 4.8mcy/yr. Extrapolation indicates that over 20 years the entrance channel requires roughly 160 mcy of dredging versus 97 mcy for interior channels so that more than 60 percent of total dredging occurs in the entrance channel. Certainly the large volumes dredged from the entrance channel justify some major treatment and discussion in the DMMP report.

As a result of the above comments, we cannot accept the statement at the top of p. 1-7 which, for the entrance channel and ODMDS, states: "...there is not a need for a detailed analysis for managing the disposal of material dredged from these reaches.." The DMMP should seriously

address all dredge material disposal issues, and the Entrance Channel and ODMDS represent a significant portion of the entire project.

**Significance – High:**

A DMMP update is an opportunity to improve project performance by reducing adverse effects to the ecology and human-serving potential of the shore and wetlands, which are highly valued by modern society. The credibility of the SEIS is undermined by avoiding this opportunity. It is also undermined by avoiding serious treatment of the entrance channel and ODMDS. The CZMA Consistency Determination (App. K) may be incorrect.

**Comment Cross-referencing:**

- (1) The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.*
- (2) Options to reduce the dredging requirement (average rate of dredging) should be investigated.*
- (3) A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (11) The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.*
- (14) There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.*

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to address the following:

**Overall**

- Identify Project Effects to Gulf shore and wetlands tributary to the channel
- Identify change in project impacts associated with each alternative
- Consider options to improve alternatives to mitigate adverse effects.

**Entrance / Gulf sands:**

- **Beach Erosion:** Around the U.S., disposal of dredge material into an ODMDS is often controversial with states and the public because beach quality littoral sands can be lost from the active littoral system, possibly leading to enhanced shore erosion.
- **Beneficial Reuse:** Material dredged from the Entrance Channel might be suitable for beneficial use and might more appropriately be transported inland for that purpose at local cost. This should be explored relative to the State of Louisiana and CZMA consistency.
- **Sustainability and Dredge Practice:** Related to the sustainability issues, it is stated that material placed in the ODMDS is “swept” from the site by currents. Check entrance / ODMDS sand budget to check for sand recycling from ODMDS to channel.
- **Inlet / Entrance sand budget:** Develop an inlet/entrance sand budget including shoreline changes on either side of inlet

**Tributary Wetlands:**

- Sediment budget of wetlands
- Identify sediment pathways – are tributary channels incising, eroding?
- Investigate beneficial reuse of dredged material to mitigate wetland degradation.

**Comment 7:**

**The report does not provide sufficient detail about the proposals and the selection process for Beneficial Use sites.**

**Basis for Comment:**

Optimizing the beneficial use of dredged material is cited in Section 1 as an objective of the DMMP. In addition, the evaluation of environmental benefits is a criterion for selecting a recommended management alternative (see page 2-73). For these reasons it is important to provide a detailed presentation of viable Beneficial Use projects and a transparent description of the Beneficial Use project-selection process.

The selection process for Beneficial Use sites is not transparent because the reasons for the selection or rejection of projects are not clearly presented. Many of the 78 proposed projects that are not included among the selected projects are rejected for specified reasons. However, over 40 of the proposed projects, most of them Beneficial Use projects, are dropped for reasons which are not specifically identified. At least two of the projects (numbers 26 and 47) are identified on page 2-25 as selected projects but do not appear in the tables describing the projects actually included in the developed alternatives (Tables 2-5 and 2-6).

The report lacks detail regarding several aspects important to the evaluation of Beneficial Use sites. For example, site-specific maps for the Beneficial Use sites, such as those included for the CDF sites, are not included in the report. The report cites uncertainty about landowner status for several projects but does not explain why this uncertainty could not be further resolved. The report states that additional Beneficial Use sites that may become available in future years would be included in Alternative B, but does not indicate how the sites would be identified and incorporated into the disposal plan. The report also does not examine the long-term viability of Beneficial Use sites relative to CDF sites, and does not describe how strongly specific projects were suggested or recommended by the public.

**Significance – Medium:**

A more precise analysis of Beneficial Use projects and the project-selection process could lead to revisions in the selection of projects comprising Alternatives B and C.

**Comment Cross-referencing:**

NA

**Recommendations for Resolution:**

To resolve the concerns raised by this comment, the report would need to include in Section 2 the following information:

- A thorough presentation of the reasons for selecting or rejecting all projects, including a table showing the final disposition of all proposed projects.
- Site-specific maps for the Beneficial Use sites, such as those included for the CDF sites.
- Clarification of the reasons why uncertainty about landowner status for several projects could not be further resolved.
- A description of how additional Beneficial Use sites that may become available in future years would be identified and included in Alternative B.

- A description of whether the upland disposal sites in Alternative C would be sufficient for disposal of dredged materials during an emergency such as a hurricane or ship grounding, and if not, why not.
- Clarification of the consequences of abandoning CDF sites in Alternative C and what investments would be lost.
- Consideration of sea-level rise and the effects on marsh habitats.
- Consideration of the long-term viability of Beneficial Use sites relative to CDF sites.
- A description of public support for each project, specifically, the number people and public agencies expressing support for each project.

<b>Comment 8:</b>
<b>The method for combining evaluation criteria to determine evaluation scores is not sufficiently supported.</b>
<b>Basis for Comment:</b>
<p>The selection of a recommended disposal alternative is based on scores that are determined using six specified criteria. Each alternative is scored on each criterion, and the total score for each alternative is the sum of the six criteria-specific scores. The six criteria are thus given equal weight in the development of a recommended plan. More careful consideration of how the relevant criteria relate to one another and how they should be weighted and combined would better support the selection of a particular option.</p> <p>Difficulties associated with the current scoring process are illustrated by the example of landowner participation in the Beneficial Use projects. Uncertainty in the willingness of some landowners to participate in Beneficial Use projects is cited as the basis for assigning a low score to Alternative C on three of the six criteria: “Capacity,” “Acceptability Risk,” and “Use Risk.” Risks associated with the acceptability of the projects to landowners (acceptability risk) and the resulting uncertainties in the use of the sites (Use Risk) are in fact the same issue, and should not be counted two or three times as separate components of the evaluation. The same is true for the capacity criterion, since potential limitations in disposal capacity are equivalent to limitations in the use of the disposal sites. The treatment of capacity as an evaluation criterion seems inappropriate, because the alternatives under consideration were all developed to provide sufficient capacity, as demonstrated in Section 2.0.</p> <p>The risk associated with each project, and with Beneficial Use sites in particular, is an important factor in the evaluation. However, several factors affecting risk are not sufficiently considered. For example, if significant risk results from the fact that “geotechnical and engineering studies have not yet been conducted” for many Beneficial Use sites (2-75), then further study could eliminate these risks and this possibility is relevant to the evaluation of risk. The risk that CDFs will erode and result in recycling of dredged material into the channel or loss of disposal capacity is not sufficiently considered when evaluating the alternatives, especially given the project history of extensive erosion of CDFs and the lack of measures to address this erosion. The loss of 756 acres of oyster habitat in Alternative B is not addressed in the numerical evaluation, either as a mitigation cost or an environmental loss. The long-term sustainability of the alternatives beyond 20 years is potentially an important factor affecting the selection of an appropriate alternative, but this factor is not addressed in the evaluation scoring process.</p>
<b>Significance – Medium:</b>
Refinement of the evaluation criteria and the use of weights to reflect the importance of particular criteria could affect the selection of a recommended alternative.
<b>Comment Cross-referencing:</b>
(1) <i>The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.</i>

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- Revise the method for developing evaluation scores to eliminate duplicative scoring of related issues.
- Incorporate sustainability into the development of evaluation scores.
- Develop explicit weights for each criterion. Alternatively, develop criteria for which equal weights may be justified, for example, by combining the three separate risk criteria into a single factor and eliminating “capacity” as an evaluation criterion. An explicit justification should be provided for the selected weighting scheme.
- Conduct the appropriate geotechnical and engineering studies that would enable the technical risk associated with Beneficial Use sites to be better evaluated.
- Expand the scoring process to address the risk that CDFs will erode and result in recycling of dredged material into the channel or loss of disposal capacity.
- Expand the scoring process to address the loss of 756 acres of oyster habitat in Alternative B, either as a mitigation cost or an environmental loss.
- Incorporate into the evaluation scoring process the long-term sustainability of the alternatives beyond 20 years.

<b>Comment 9:</b>
<b>Several elements within the economic analysis are not sufficiently described.</b>
<b>Basis for Comment:</b>
<p>The analysis of costs and benefits addresses the important threshold question of whether maintenance dredging of the channel and the cost of disposal of dredged materials is justified economically. However, certain elements of the benefit-cost analysis are incomplete or unclear.</p> <p>The scope of the benefit-cost analysis is not sufficiently broad. The analysis is based on the assumption that a decrease in depth of the Calcasieu Channel will lead to a greater number of smaller-draft vessels importing a constant volume of cargo. A more complete analysis would examine the possibility of vessels diverting to other ports, or of vessels lightering cargo at other ports and then proceeding to the Calcasieu Channel with shallower draft, or the construction of offshore unloading facilities. These limitations in scope are noted in the report and may be justified, but the report does not provide sufficient justification for the limitations.</p> <p>In Appendix D, the costs of disposal are presented in a condensed format without a clear description of the calculations. It is not clear in Appendix D to what the cost figures in Tables D-1, D-2, and D-3 refer, and how they were developed. The assumptions and dimensions used for rock dikes and shore protection are unclear. It is not clear whether shore protection (stone revetment) costs for Alternative B are fully included in the cost estimates (Table D-5 shows that revetment costs are the major cost item for Alternative C, but it is not clear if the revetment costs for CDFs D and E are included in the cost of Alternative B). The report does not include a presentation of cost uncertainties, such as cost variability per cubic yard for dredging, cost variability per mile of pipeline length, and cost per ton for armor stone,</p> <p>Two assumptions with respect to the calculation of benefits are not well supported. First is the assumption that all crude and liquid natural gas is currently transported in vessels with 40-foot draft (Tables 12 and 13), while in fact many vessels are currently operating at lower draft and would not immediately be affected by reductions in channel depth below 40 feet (Table 10). This leads to an overestimate of the benefits of maintaining specified channel depths. Second, vessel costs at sea are likely to decline somewhat as cargo tonnage declines rather than remain constant as suggested in Table 13.</p> <p>Two additional points are not clear. First, the benefit-cost ratios appearing in Table 2-10 are not well documented. It is not clear what these ratios refer to or where they are calculated in Appendix E. Second, the calculation of benefit-cost ratios appearing in Appendix E, Tables A-1 to A-7, and the interpretation of ratios calculated for alternative draft reductions, are confusing and are not clearly presented.</p>
<b>Significance – Medium:</b>
A better description of these elements of the economic analysis would contribute to the completeness and clarity of the report.
<b>Comment Cross-referencing:</b>
NA

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- The scope of the benefit-cost analysis should be expanded to address the diversion of vessels to other ports and the lightering of vessels prior to use of the Calcasieu Channel. Alternatively, the reasons for the limitations in scope should be more thoroughly discussed.
- A more complete description of the specific steps leading to the final cost estimates should be presented so that the calculations can be reproduced.
- The cost tables in Appendix D should be clarified by including a table comparable to Table 5-1 (Section 5.0) for each alternative.
- Figures or graphics should clarify the assumptions and dimensions used, for example, cross-sections of rock dikes and shore protection.
- The report should clarify whether shore protection (stone revetment) costs for Alternative B are fully included in the cost estimates.
- A description of cost uncertainties should be provided, such as cost variability per cubic yard for dredging, cost variability per mile of pipeline length, and cost per ton for armor stone.

<b>Comment 10:</b>
<b>The selection, use and assumptions used for the Wetland Value Assessment functional assessment procedure and the details for how the measures of wetland services and functions are translated into Habitat Suitability Index are poorly described.</b>
<b>Basis for Comment:</b>
<p>There is a general vagueness throughout the document with respect to living resources and habitat value. This is not to be confused with the actual data presented, which appears to be adequate, but on the assigned values. For example, it is not clear what the last sentence in the Aquatic Consequences section refers to. If it were referring to Table ES-1, it may not be appropriate to characterize the difference between Alternative B and C as generally minor relative to habitat and the “other environmental resources and conditions” as they are not described. Another example would be in the section on Affected Environments, where the commercial fishing for the entire state is discussed but not the contribution from the project area.</p> <p>The most pronounced mismatch between habitat suitability and the actual habitats, in term of mitigation, comes from the less than one to one equating of oyster reef to marsh. The importance of oyster habitat is being overlooked both ecologically and economically. It is clear in the published literature (much of it summarized in: Richard F. Dame, 1996. Ecology of Marine Bivalves, An Ecosystem Approach, CRC Press) that oysters and the habitat they create is one of the most productive habitat in estuaries. While a detailed study of oyster reefs was conducted, it does not appear to have been incorporated into the overall evaluation of Alternatives. It is not clear as to how much interaction there was between the Corps and resource agencies. One letter from LA DWF is a waiver for the “project area you’ve described” for oyster seed ground mitigation. Are there other opinions, from US FWS?</p> <p>Much of the vagueness relative to habitat may come from the use of the Wetland Value Assessment (WVA) method. It has not been widely applied and may be too generalistic in assigning value. Consideration needs to be given to why WVA was used and if there would be a better wetland functional assessment procedure for the project area. WVA is actually insensitive to the habitat needs on individual species. An evaluation of wetland loss by the National Academy titled “Compensating for Wetland Losses Under the Clean Water Act” (<a href="http://books.nap.edu/openbook.php?record_id=10134&amp;page=R1">http://books.nap.edu/openbook.php?record_id=10134&amp;page=R1</a>) summarized 40 procedures (including WVA). Reasoning as to why WVA was selected from the many would be helpful.</p>
<b>Significance – High:</b>
The way habitat for living resources is valued will affect future cost/benefit ratios, determine which habitats will be created/destroyed, and recreational/commercial utilization of these resources.
<b>Comment Cross-referencing:</b>
NA

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to:

- Provide a better summary and representation of habitats lost and gained in the Executive Summary section.
- Provide justification for use of WVA.
- Provide interpretation of the WVA conducted by Gulf Engineers Consultants, Inc. Currently there is no interpretation.
- Provide the reasoning that led to the project having a less than one to one mitigation for oyster reef to marsh area.

**Comment 11:**

**The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.**

**Basis for Comment:**

The modeling has only a limited bearing on the alternatives analysis, by coarsely addressing the effects on currents and sediment transport associated with CDF expansion for Alternative B. The model did not include tributary wetlands, and did not provide information to evaluate alternatives other than Alternative B. The study objective (pg 2 “The primary goal of the combined hydrodynamic and sediment transport modeling effort was to identify sediment sources and sinks, as well as associated sediment pathways.”) is generally not achieved.

The modeling effort was a good one, but was hampered by the size and complexity of the system and limited data. The accuracy and utility of the model are over-stated by the authors. Other analyses (sediment budget, additional field data, geomorphic changes, simplified sedimentation model) could have supported a better modeling and overall assessment of the shoaling problem and alternatives.

The hydrodynamic and sediment transport models do not answer the question: why does the highest sedimentation occur in the channel where the highest flow velocities occur? It seems evident that the un-naturally deep channel itself induces high shoaling rates - but why does it shoal most rapidly precisely in the location of highest flow velocities? The modeling does not shed light on these questions. This has significant importance to the project because Alternative B calls for narrowing the channel by moving dikes (with revetment) back to a historic location closer to the channel.

The study of vessels effects lacks a conclusion regarding how important the vessel wake effects really are. Data and analysis do not give an indication of bed changes or erosion caused by vessel wakes. Results also do not give an indication of how important the vessel-related sediment transport is compared to natural tidal or wind-wave transport.

An area of concern with regard to TSS and bed changes would be in the open water areas of Lake Calcasieu. It is not clear from results shown whether proposed modifications might have a subtle effect on TSS or bed change in the lake or, for example, over existing oyster beds. Results for predicted bed change pre-and post project should be presented.

The effects of the stone revetment on sediment erosion/deposition, bed change, and future dredging are unclear. Results show some increases in bed shear stress caused by channel constriction compared to the existing conditions, but there are no results showing differences in bed changes from existing conditions. As a result, possible bed changes resulting from proposed modifications cannot be assessed.

**Significance – High:**

The hydrodynamic modeling in Appendix C does not support the alternatives analysis and is not well integrated into the SEIS. It is not clear that hydrodynamics have been addressed sufficiently and whether the SEIS is adequate.

**Comment Cross-referencing:**

- (1) The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.*
- (3) A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (4) Several appendices were written primarily to support Alternative B and thus, do not evaluate Alternative C.*
- (5) Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability.*
- (14) There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.*

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- Extend model limits to include wetlands tributary to the main channel, or explain why this is not done.
- Explain hydraulic and sediment connections to Sabine and other wetland areas, if any.
- Focus analysis to address the effects of the alternatives on sedimentation and maintenance dredging requirement. In particular, recycling of dredged material from the CDFs should be addressed.
- Address effect on dredging requirement due to CDF erosion.
- Validate the model using a different data set and assess model accuracy in the validation, and appropriate uses / interpretations.
- Use suspended sediment concentration data for calibration and verification
- Analysis of estuarine deposition using a 1-D model.
- Analysis of marine sand deposition using inlet geomorphology / hydrodynamic analysis.
- Consideration of shoaling and erosion patterns, including wetlands.
- Assess importance of vessel wake to sediment transport vs tidal and wind-wave transport.
- Address wind waves and erosion of CDFs and sediment influx to channel.
- Assess utility of fundamental project assumption that CDFs adjacent to channel reduce sediment deposition in channel.
- Explain model limitations and implications
- Correct errors / explain inconsistencies / unclear items:
  - State how vertical control was established for each of the measurement locations, and how certain the investigators are of a common vertical datum without bias. Figure III-6 appears to have datum error. Checks graphs for consistent datum.
  - Page 30 says Lake Calcasieu depth data from 1930s but Section 3.2.1 says 1996 NOAA chart 11347 is available.
  - (100) Text refers to data plots of vessel wakes in Appendix 1, but this appendix is not included.
  - Many references not included.
  - Figures III-7 through III-11 have unit of both meters or feet – select one.
  - Figure V-13 indicates high suspended solids and Figure V-18 indicates high deposition in Lake Calcasieu, similar to channel. However, the model indicates the channel is depositional but does not adequately explain the lake

<b>Comment 12:</b>
<b>A more thorough summary of prior studies, and of public and agency input, is needed.</b>
<b>Basis for Comment:</b>
<p>The DMMP is termed a “Supplemental” EIS and it builds on a considerable volume of prior work. But the limited reviews presented of two prior EISs are inadequate, and the reader gets no real sense of what major issues were raised in previous environmental studies. Similarly, it is not clear what critical issues were identified in previous design studies for channel dredging or CDF construction. A more thorough treatment of prior studies, identifying critical or key issues, is needed to ensure that the DMMP addresses these concerns.</p> <p>The report is surprisingly short on public comments and, as written, very little public input is documented. Minutes or summaries of public meetings should be included to summarize the sense of public input. The text refers to the public comments in Appendices N and Q, but Appendix N contains just one comment letter, while Appendix Q contains no public comments at all. Appendix Q refers to a table of comments but this table is missing.</p> <p>The use of “brainstorming sessions” to evaluate alternatives is mentioned and is appropriate. However, there are no indications among the 78 alternatives identified as to how strongly they were suggested or recommended by interested groups. Some indication of the degree of consensus for the many options would be useful.</p> <p>As for other agency comments, there are limited comments from USFWS in Appendix M and from NMFS in Appendix P, but no other comments. It seems odd that there are no official comments from other federal agencies like EPA or USGS, from State of Louisiana agencies like LDWF and LDNR, or from the Cameron Parish local government.</p>
<b>Significance – Low:</b>
It is stated in the report that selection of Alternative B over C may be controversial. As a result, a complete documentation of public and agency input is crucial.
<b>Comment Cross-referencing:</b>
<i>(4) Several appendices were written primarily to support Alternative B and thus, do not evaluate Alternative C.</i>
<b>Recommendations for Resolution:</b>
<p>To resolve these concerns, the report would need to be expanded to include:</p> <ul style="list-style-type: none"> <li>▪ Provide documentation of public and agency input.</li> <li>▪ Provide better summary of critical issues from past studies and note how these have been addressed.</li> </ul>

**Comment 13:**

**Report needs to eliminate inconsistencies between appendices and the main body of the report.**

**Basis for Comment:**

It appears that different appendices were authored by different organizations, written at different times, and were not re-written or edited by the MVN to ensure consistency with the main body of the report, or among the various appendices.

Some examples (not all inclusive) include the following:

(1) Beneficial Use sites discussed and shown in Appendix J (404 Evaluation) are not the same as those shown in main report Figure 2-20. Some sites shown in main report are not evaluated in the Section 404 study.

(2) Sediment grain size information is inconsistent. Appendices C and J show different sediment grain size information. References to these are incomplete and cannot be cross-verified. The high sand fractions in Appendices C and J are not considered in other appendices.

(3) The main report cites wind-waves as a significant factor in dike erosion, but appendices do not include any analysis of wind waves or related erosion. Without a wind-wave study, it is not clear why the many miles of lake-side stone revetment are required.

(4) The report attributes bank erosion to vessel effects, but this is not fully established in Appendix C and it is not proven that vessel effects are more significant than tidal currents. Bank erosion rates in the main report are not presented or analyzed in any appendix.

(5) The report states that salinity regimes would not be altered, but this has not been evaluated in appendices and may be an issue for Beneficial Use sites, especially if side-cast borrow ditches are dredged (which were not analyzed for their hydrodynamic effect).

(6) The main report states that it is feasible to raise dikes. As noted in Comment 5, Appendix B did not consider the most critical dike cross sections as described in the main report so that the feasibility of dike construction has not been fully established.

(7) Benefit to cost ratios of 5.5:1 or 5.9:1 cited in the main report cannot be found in Appendix E. Appendix E appears to present incremental B/C analysis but not the total of overall B/C ratios for the project alternatives.

(8) Some conclusions in appendices are not evaluated and are not listed in the main report. For example, the conclusion in Appendix A that "Areas of the ship channel could be mined to ...provide advanced maintenance to lessen the maintenance dredging burden in areas of high accumulation" is not specifically analyzed. This should therefore be removed as a conclusion from the Appendix.

(9) As noted in Comment 12, the main report cites public comment in Appendices N and Q, but no substantive public comments are included in these appendices.

As noted in Comment 4, most appendices focus almost exclusively on issues related to Alternative B and do not evaluate Alternative C. This indicates that Alternative B was likely the preferred plan at the time the appendices were prepared. If Alternative C was to be ultimately selected as the preferred plan in the main report, many appendices would be inconsistent with, and would not support, the main report.

**Significance – Low:**

The appendices should support the main report and should be consistent with the main report.

**Comment Cross-referencing:**

- (4) Several appendices were written primarily to support Alternative B and thus, do not evaluate Alternative C.*
- (5) Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability. The feasibility of many dike sections is not established.*
- (6) The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.*
- (9) Several elements within the economic analysis are not sufficiently described.*
- (11) The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.*

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- Issues noted in Basis for Comment above should be addressed. The report should be edited to resolve conflicts between the appendices and the main report.

**Comment 14:**

**There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.**

**Basis for Comment:**

The effects of uncertainties in either the data or analysis methods are not sufficiently discussed in the report. Some parts of the report do a good job in including uncertainty (economic analysis of future LNG imports) while other parts of the report (engineering evaluations) do not consider uncertainties. These uncertainties may influence selection of alternatives and impact some conclusions.

In many parts of the report, only mean values are presented without any indication of the range or variability in the parameters. One example is the use of mean values to assess potential for toxicity without indications of variability. Another example is the use of mean dissolved oxygen values, where mean DO values are acceptable but minimum DO values indicate possible hypoxic conditions below state standards. This is an example of why min/max or standard deviations would be helpful in assessing impacts.

In some parts of the report, large amounts of environmental data are presented in tables and appendices, but there is insufficient interpretation. For example, Appendix P Wetland Value Assessment is 142 pages long and has less than half a page discussion of results and no indication of uncertainty or variability of results.

Large uncertainties may be inferred from the geotechnical analysis of dike stability. Only one hypothetical dike cross section was analyzed. As noted in Comment 5, this cross section does not appear to be representative or the most critical for dike stability. Geotechnical analysis appears to be based on a single sediment sample, so it cannot be determined if this is representative of all project areas.

Based on historical evidence (erosion rates and photos of eroding CDF dikes) there is some risk of increased maintenance dredging requirements due to increased CDF erosion following construction of higher dikes and higher placement thicknesses. These risks should be addressed, as these may affect Alternative B negatively.

Similarly, uncertainties in dredge volumes are not quantified or factored into the selection of the alternatives. Prior studies have indicated future dredge volumes 30 percent higher or 30 percent lower than those adopted in this study. This range of estimates may influence the selection of alternatives as one alternative may be more adoptable, or have excess capacity to handle higher dredge volumes.

The shoaling analysis in Appendix A does not remove uncertainties in dredge volume predictions. Conclusions are based on a subset of the historical dredging data. Data from before 1994 was not used and there was no indication as to why older dredging records were not used. The data subset (1994-2005) has several limitations as, for example, there has been only one dredging event in the time period in some reaches, and volumes dredged per year are highly variable. These factors make the 96 mcyr projection highly uncertain. Estimates

of future dredging should be based on the full data record, and should be cast in term of ranges or expected variability (min-max-mean or mean plus/minus standard deviation).

With regard to modeling, the hydrodynamic model in Appendix C computes depth-averaged 2D horizontal flows, not realistic 3-D flows. This is probably sufficient in all shallow water areas, but current measurements show that flows in the navigation channel are strongly three-dimensional. Logic also suggests that the flow would have salinity stratification. The hydrodynamic and sediment transport models employed in this study are not capable of replicating these processes, and some discussions of these limitations should be included.

The sediment transport model only represents the physics of suspended fine-grained sediment (silt and clay). Sediment grain size data show a surprisingly high percentage of sand in sediment samples (30 to 80 percent in places) yet the sediment model adopts only 5 percent sand. The study should include some discussion of why the simulated sand fraction is so low and how this influences model results and conclusions.

Real estate uncertainties are highlighted in the main report as critical issue for Alternative C, yet these are not explored in Appendix T. These uncertainties are listed as a factor in two of the six criteria used to evaluate and select the preferred alternative. More should be done to quantify and these uncertainties.

**Significance – Low:**

Limitations on data and lack of uncertainty analysis are not “show stoppers” but should be part of any modern study of this type. Some alternatives may adapt to uncertainty better than others.

**Comment Cross-referencing:**

- (1) *The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.*
- (3) *A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.*
- (4) *Several appendices were written primarily to support Alternative B and thus, do not evaluate Alternative C.*
- (5) *Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability. The feasibility of many dike sections is not established.*
- (6) *The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.*
- (7) *The report does not provide sufficient detail about the proposals and the selection process for Beneficial Use (BU) sites.*
- (8) *The method for combining evaluation criteria to determine evaluation scores is not sufficiently supported.*
- (11) *The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.*

**Recommendations for Resolution:**

To resolve these concerns, the report would need to be expanded to include:

- Issues noted in Basis for Comment above should be addressed. The intent is that issues should be addressed through additional text and not through new calculations or lengthy technical analysis.